

1993 Taurus SHO *ATX to MTX conversion*
NKB, RWB 23 Jan 06

I've always wanted a 5-speed SHO, but my '93 ATX has deep sentimental value and is in great condition. And I certainly can't afford to be fixing/modding two SHOs, so what to do? Take a rusted-body \$150 MTX SHO, \$3k in new/used parts, and several long days to realize that dream!



1993 Taurus SHO 3.2L ATX – 116k miles (original transmission)

Before he passed away two years ago, my younger brother poured his heart and soul into this car. No way could I ever get rid of his baby.. so lets make it faster instead (he woulda loved this).



1990 Taurus SHO 3.0L MTX – 160k miles (mechanically sound, body = New York hard life)
Purchased for \$150 from my buddy, AP. I was disturbed by how much quicker it was than the ATX. I kept telling myself it was the corrosion lightening mods that made it faster.

The basic plan was to drop the entire engine, transmission, front suspension and subframe assembly from each car, swap the necessary components, and reinstall back into the '93. "Dropping" the subframe is actually a misnomer since we used a two-post car lift to raise the body off the subframe, which was supported on four jackstands:



Dropping the entire assembly in this way took about 4 hours, mainly spent trying to remove the corroded subframe bolts.



Here's a shot of some of the parts I stripped from the MTX that would be needed later.

Of all the issues I faced, the one that held the greatest potential for disaster is not keeping track of inventory. I took the extra time early on to make my life easier when putting things back together by using several sizes of labeled Ziploc bags to keep track of each part and the fasteners associated with it.

The following is a list of all the parts I took from the MTX donor. Generally, I also used the fasteners from the 3.0L unless there was a matching fastener from the 3.2, which weren't as corroded. All of the parts on the list are unique to the MTX and are needed to do the swap the way I did (double belt accessories, 3.0L timing), but some should be purchased new when possible for obvious reasons.

Parts needed from the 3.0L MTX

- Subframe
- Transmission
- Flywheel (or get a new one)
- Clutch and throw out bearing (bought a Clutchmasters Stage-1 kit)
- Pressure plate to flywheel bolts (not usually included in a clutch kit)
- Flywheel to crankshaft bolts (longer than the ATX bolts)
- Y-pipe
- Brake pedal and clutch pedal assembly
- Clutch cable
- Rod shifter (got one off of Ebay)
- Bent resonator pipe (bought a new one)
- Exhaust spring kit (bought new)
- Exhaust manifolds w/ heat shields
- Front and rear engine mounts
- Transmission mount
- Torque limiters and brackets (the little black shocks between the engine and the strut towers).
- Brackets connecting engine mounts to block
- Stub axle shaft w/ bearing
- Crank pulley
- Alternator and brackets
- PS Pump pulley (I used the lower mileage '93 PS pump)
- Water pump pulley (bought reman 3.0L pump, used 3.2L rear half)
- Water pump inlet pipe
- Accessory tensioner pulleys and brackets
- Timing belt covers (plastic and metal)
- Timing belt tensioner
- Lifting eye on front of motor
- MTX lower speedo cable
- Intake hose (from MAF to TB)
- Crossover tube from 3.0L intake (needed to clear 3.0L timing cover)
- Heater hoses (bought new)
- Radiator hoses (bought new)
- All power steering hoses (bought new, except for the reservoir to pump hose)

Notes:

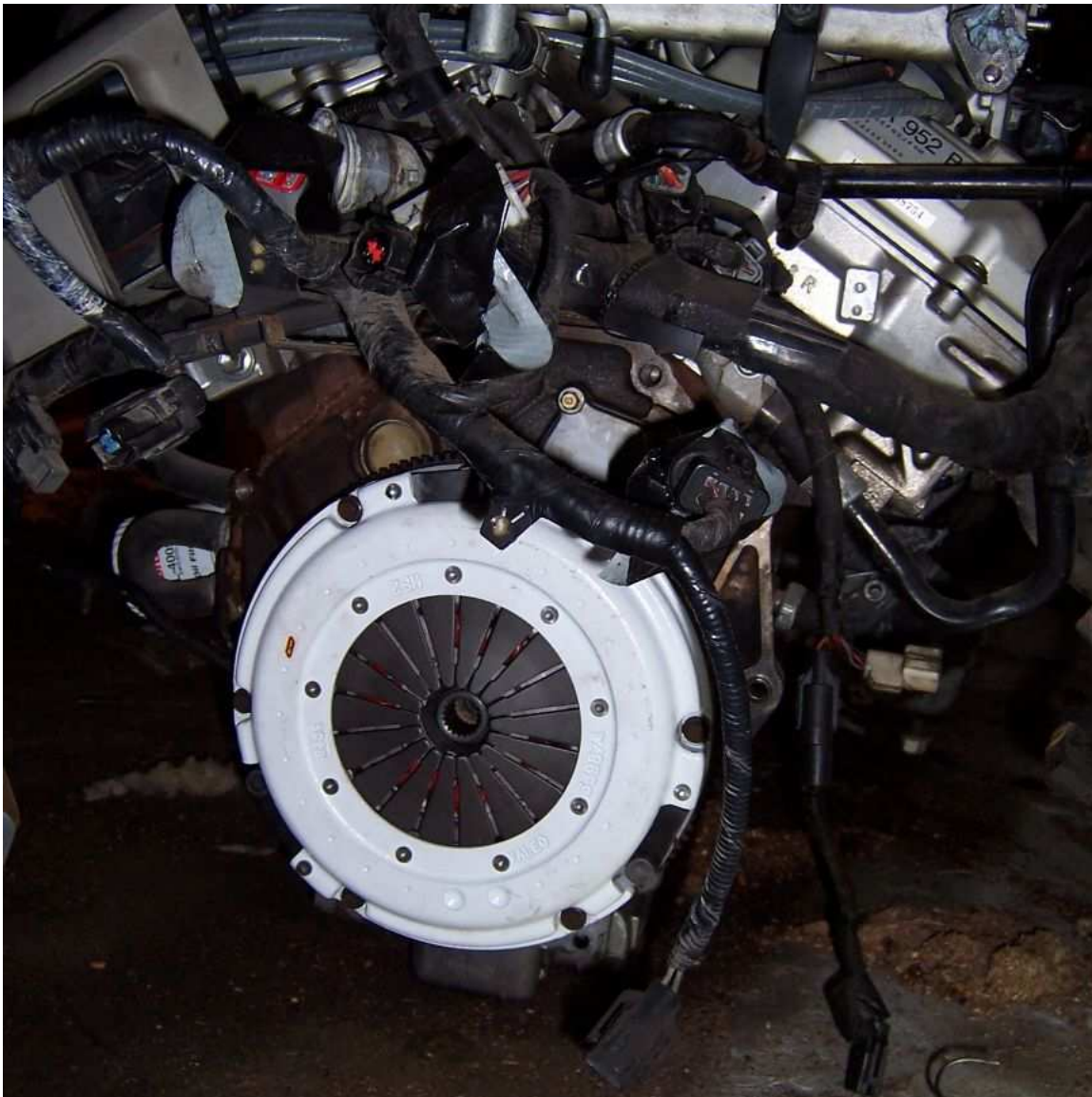
- I used the 3.2L wiring harness and 3.2L computer (D4U1). It works great, but I need to disconnect the CEL and O/D lights that are constantly flashing since the PCM can't find the ATX tranny or the EGR system. Also you need to trick the computer into running correctly (more on that later).
- I used the MTX y-pipe with the 3.2L ATX oil pan, and had no fitment problems except one of the transmission bolt holes doesn't line up. There are seven more (larger) bolts holding the transmission to the engine, so I figured it wasn't worth taking the pan off just for one bolt.
- I deleted the A/C, so I don't know if the MTX compressor is necessary.
- I'm still running 3.2L intake cams. The available 3.0L had scored journals.
- I used the 3.2L rear half of the water pump. If I did it again, I'd use the 3.0L rear half. They're slightly different and the 3.2L part interferes slightly with the 3.0L middle timing belt cover.

I wanted to take a bunch of pictures of the reinstallation process, but as luck would have it my camera batteries died so photos are very limited.

After dropping the subframe assembly from the '93 in the same manner as the '90, I separated the 3.2L engine from the transmission and removed the torque converter from the crankshaft. It was then time to install the shiny new Fidanza 9lb flywheel, which I opted to have blanchard ground at a local shop to reduce the chances that it would chatter.

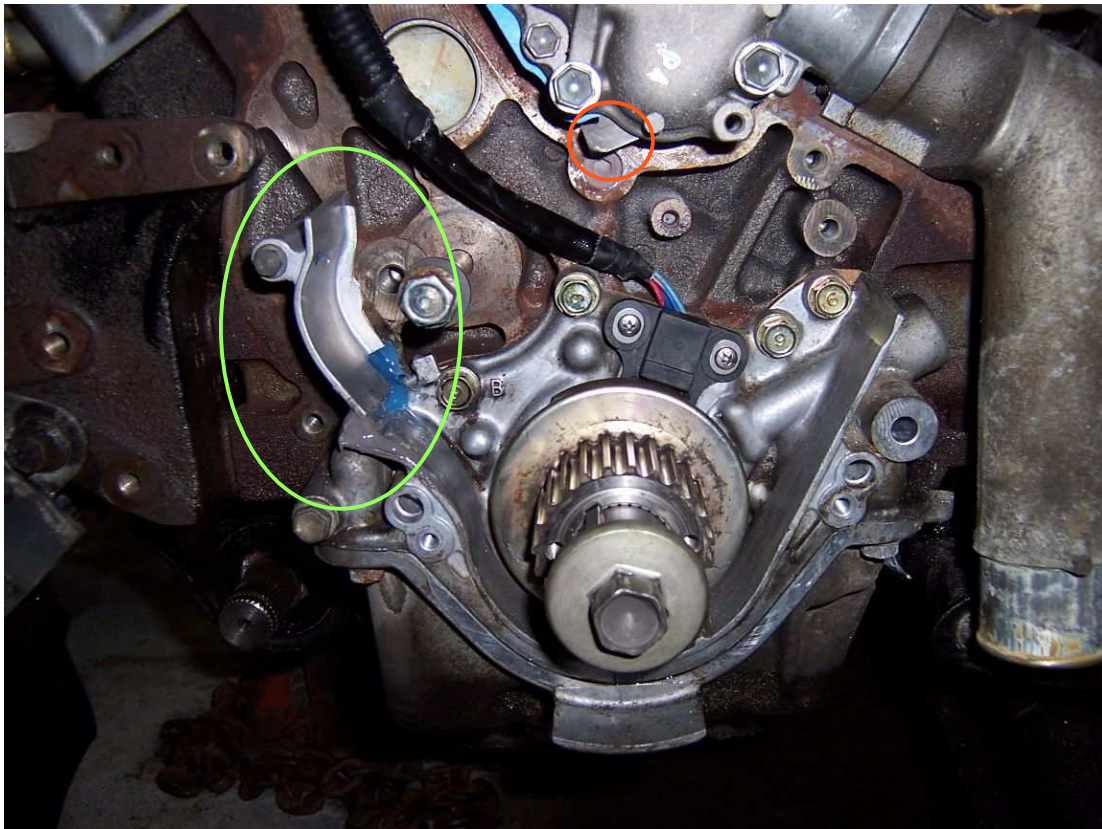


The manufacturing tolerances on the aluminum flywheel are such that the diameter that pilots on the crankshaft is a little tight and won't slide right on. It has to be this way to prevent it from coming loose when the motor comes up to temperature. For installation, I thought I'd try heating it up a little to loosen the interference fit, but that didn't make much difference. I ended up using the crank bolts to draw the FW onto the crankshaft, making sure to tighten slowly in an alternating star pattern, which seated the FW nicely.



3.2L motor with the Fianza FW and Clutchmasters Stage 1 clutch.

When installing the locating dowels into the aluminum flywheel, be sure to use the set of three holes that's closest to the outside edge, as the inner set of holes does not match up with the later model pressure plates (9.75" clutch). I had to grind about 1/16" off the end of the dowel pins to allow the PP to fully seat on the FW.



3.2L oil pump modification to provide timing belt cover seal

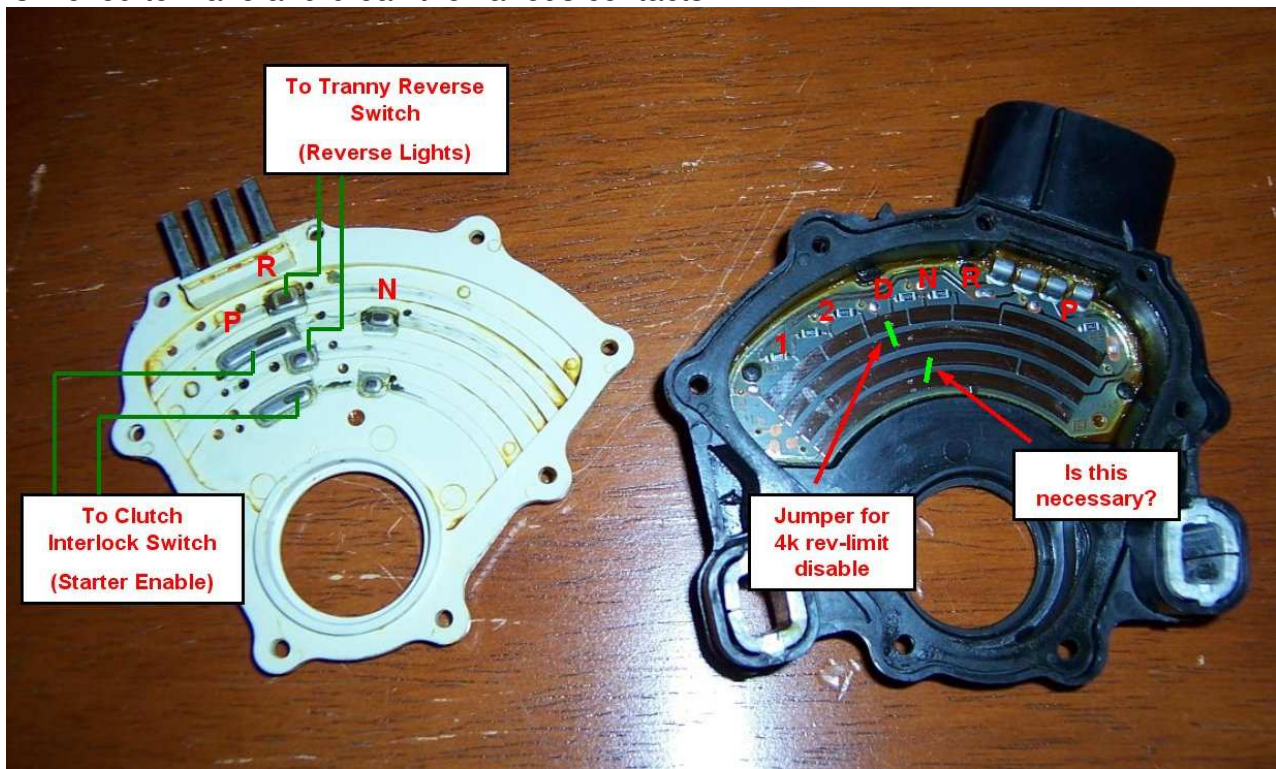
The edge on the 3.2L oil pump that seals against the lower timing belt cover doesn't extend as far as on the 3.0L oil pump. I wanted to retain the 3.2L oil pump since it may put out a little higher flow, and I didn't have a new gasket at the time. To seal up the big hole between the pump and the timing cover, I cut a chunk off the 3.0L pump and JB welded it into place (circled in green). If the adhesive fails and the chunk rotates over, the tensioner will keep it out of the timing belt.

Also note on the far right in the picture above, the inlet spout on the water pump is from the 3.0L engine. The red circle indicates the protrusion from the inner half of the 3.2L water pump that interferes with the middle 3.0L timing cover. I ground it down with the Dremel, but it would have just been easier to use the whole pump from the 3.0L in the first place.

“Tricking” the 3.2L PCM

As several others are running 3.2L computers with manual transmissions (Shoaz, OffroadSHO), I thought I'd give that a shot since I didn't feel like messing around with any more wires than necessary. The main hurdle to this approach is tricking the PCM to think the transmission is simultaneously in “Drive” and “Park” to allow starting and drivability. The ATX needs to be in either “P” or “N” to enable the starter, but needs to be in “D” to disable the 4k RPM rev limiter that protects the torque converter when in “P” or “N”. Actually, this turned out to be pretty easy, with some pointers from Shoaz.

The ATX tells its PCM what gear is selected using the Manual Lever Position (MLP) sensor. The MLP is located on the selector shaft on the top driver's side of the ATX tranny. The following picture shows the MLP sensor split open to reveal the connections that must be made. Not shown is the wiper arm that rotates as the shifter is moved to make and break the various contacts.



The white half of the sensor controls the starter enable and the reverse lamp circuits. I soldered a pair of wires on the respective contacts and ran the backup light wires to the reverse switch on top of the MTX. The starter enable wires went through the firewall (I ran them with the clutch cable) and connected to the clutch interlock switch, so that the starter is enabled when the clutch is depressed as in a stock MTX.

The black half of the sensor contains the circuit that tells the PCM what gear it's in. By shorting the contacts as shown, the PCM will think it's always in Drive and override the 4k RPM rev limit. Fortunately, the white and black halves of the sensor act independently, so it doesn't care that one half is commanding "P" and the other is commanding "D".

The other green jumper on the black half isn't necessary, that has to do with disabling the rear liftgate on the station wagon model when its out of "P". As a side note, those with the ATX have probably noticed that the park brake automatically releases when shifting out of Park. That functionality is provided by a vacuum switch built into the shifter handle mechanism and has nothing to do with the MLP sensor. When I removed the shifter handle, I removed the vacuum valve and zip-tied it into the "P" position, so the park brake always engages. For safety's sake, I'm going to cut and cap the vacuum line going to the parking brake solenoid to prevent any freak PB release events.



Along with my two invaluable assistants (thanks Dad and Bongo!), this photo shows the MTX transmission bolted up to the 3.2L engine, and the assembly fastened to the MTX subframe using the MTX motor and tranny mounts. Repositioning the subframe under the car was a breeze using two cheap furniture dollies from the hardware store.

Some other notes:

All the suspension components and subframe were painted with a rust preventative coating called POR-15, which is as tough as nails and is extremely effective.

The 3.0L accessories bolted right up to the 3.2L block, with the exception of the alternator, which required a small chunk be cut out of the front head to provide clearance. I used a Dremel and a hacksaw, which worked pretty well.

The A/C system was completely deleted for weight purposes, as well as saving that potential headache. I used the 3.2L radiator and fans, with 3.0L radiator hoses.

While the motor was out, I routed the clutch cable through the firewall. There's a rubber plug that has a small vacuum line going through the hole where the cable needs to go. I popped the plug out and have the clutch cable running alongside the hose, along with the clutch interlock / starter enable wires (in a loom). I filled up the remaining hole with some black RTV sealant. In retrospect I think that vacuum line operates the park brake release, so perhaps I should have just cut it to get it out of the way.



The rod shifter was installed using the standard procedure. This one was a nice clean one from a Cali car. The stock MTX y-pipe easily clears the 3.2L oil pan, but I did have to swap the O2 sensors over from the ATX pipe since the ones in the MTX pipe were only 3-wire sensors and the electrical connectors wouldn't mate up.

This photo shows the ATX exhaust system with the resonator removed. The resonator is longer than the MTX bent resonator pipe that is replacing it, so a patch piece is needed, as illustrated in the following picture.



The patch pipe we used measured 2.25" inner diameter by about 5" long. It slipped perfectly over both of the mating parts.



This photo shows the finished exhaust with the rod shifter installed. The MTX y-pipe easily clears the 3.2L oil pan, although the hanger is not utilized in this configuration.

One of the more significant PITA was swapping the pedal assemblies. Of course now that I know how to do it, it wouldn't be too bad. Obviously the clutch pedal must be used from the MTX, but perhaps not as obviously, the entire brake assembly must be switched too. (I had hoped to just swap the foot pad). This is because the clutch pedal assembly attaches directly to the side of the brake pedal bracket. The key to success here is installing the brake pedal first, then attaching the clutch pedal. Trying to install the assembly of both pedals is very difficult as there's not ample room under there to manipulate such a large object.

Now it's starting to look like a MTX!





I used the ATX console, which seems to work fine with a little grinding on the left side of the hole so that the rod doesn't hit the plastic when in 1st or 2nd gear. The shift boot is from a gen-II MTX, and the knob is from an 05 Mustang GT. The knob didn't fit immediately, but after hogging it out a little and a some grinding on the shifter shaft, it fits great (thread pitch was compatible).



With the knob installed, the ATX to MTX conversion was complete. Now the moment of truth! Once the battery was connected, the engine fired right up on the first try. I was halfway expecting for every light in the dash to illuminate, but as it turns out the only complaints I saw were the CEL (due to the mysteriously missing EGR system) and the O/D light flashing (the PCM was having separation anxiety for the amputated ATX transmission).

We took it for a quick test drive around town, and everything worked flawlessly. The engine ran strong, revved fast, transmission shifted great, and clutch engagement was silky smooth. The PBR Cobra brakes over 11.6" rotors are night and day compared to the stock system as well. Further, I was really amazed at how the handling agility had improved by dropping 150-200 lbs out of the front of the car. As a side note, the above picture shows the front ride height after I cut the Intrax springs by 1 full coil, which I figured was needed to offset the lightened front end.

Since the swap was finished last weekend, I've logged around 250 miles, with no problems (knock on wood), with the exception of a noisy PS pump that I didn't purge properly. Other than that, the only problem I have is keeping my foot out of it and taking it easy on the clutch until it properly breaks in!

For anyone who has an ATX they just don't want to get rid of, but really crave an MTX (and don't want multiple SHOs) I would highly recommend this swap. It's by no means a walk in the park, but it is actually pretty straightforward for the most part. With the help of others to keep you out of the various pitfalls, it can be a (mostly) enjoyable experience that will help you learn the ins and outs of the SHO. I estimate we have about 100 man hours actual wrenching time in the project, and probably at least as much time spent formulating the plan and finding all the parts. I'm including the parts list I used to keep track of everything in case anyone might find it useful.

I'd like to acknowledge those who have helped me through this project.. Thanks to my Dad for the 'rigging' support, Eric (Shoaz) for helping with the details, SHOMA for the MTX-IV, Bizzy for the smooth rebuild, NCTurboSHO and SHOparts NW for the hard to find used parts, and MidwestSHO, SHOnut, and RCM for the excellent products and customer service. Last but certainly not least, I'd like to thank my wife for putting up with all this craziness!

'93 ATX to MTX PARTS LIST (mostly maintenance items)

ATX to MTX

<u>Description</u>	<u>Vendor</u>	<u>Part #</u>	<u>Unit</u>		<u>Ext Price</u>
			<u>Qty</u>	<u>Price</u>	
1990 Parts car, runs great, looks bad!	AP		1	\$150	\$150
Rod Shifter, very clean from California	Ebay		1	\$150	\$150
05 Mustang GT Shift Knob	Ebay		1	\$30	\$30
Gen-II Leather shift boot	Ebay		1	\$8	\$8
Fidanza 9lb flywheel, updated 9.75" + shipping	Ebay, Ultrarev		1	\$294	\$294
Full length SFC's	Ebay, theoriginalscion		1	\$85	\$85
'94 Taurus Front Knuckles, w/ ABS	Local JY		2	\$50	\$100
Clutch Kit	Midwest SHO	CM stage 1	1	\$390	\$390
Clutch shaft bushings, ceramic	Shonut		1	\$30	\$30
Clutch Fork	Shonut		1	\$40	\$40
VSS	Shonut		1	\$40	\$40
Crank Position Sensor	RCM	Napa brand	1	\$57	\$57
Timing Belt	RCM	Cloyes	1	\$28	\$28
Cam Seals	RCM	Felpro (qty 3)	1	\$15	\$15
Main Seal (Front)	RCM	Front Crank Seal	1	\$8	\$8
Main Seal (rear)	RCM	Rear Crank seal + carrier gasket	1	\$20	\$20
Water pump, reman	RCM	3.0L	1	\$60	\$60
Water pump gasket set	RCM		1	\$15	\$15
Front brake lines, stock replacement	RockAuto	Acdelco	1	\$40	\$40
Exhaust Spring Kit	Rockauto	ES72142 (FelPro)	1	\$6	\$6
Bend Pipe w/ Resonator	Rockauto	Walker 45606	1	\$58	\$58
3.0L Radiator Hoses (upper)	Rockauto	Motorcraft KM3084	1	\$22	\$22
3.0L Radiator Hoses (lower)	Rockauto	Motorcraft KM3086	1	\$16	\$16
Axle Nut	Rockauto	Precision 3371	2	\$3	\$6
PS/WP belt	Rockauto	Gates K040500	1	\$13	\$13
Wheel Bearing	Rockauto	BCA	1	\$30	\$30
Speedo Cable (lower)	Rockauto	Motormite	1	\$12	\$12

Timing Belt w/ marks	Rockauto	Gates T248	1	\$37	\$37
Heater Hose #1	RockAuto	Gates 18079	1	\$7	\$7
Heater Hose #2	RockAuto	Gates 18774	1	\$7	\$7
Halfshaft Circlips	Ford Parts Network	F3DZ-3Z498-C	3	\$4	\$12
Oil Pressure Sender	Ford Parts Network		1	\$9	\$9
Quill Sleeve Loctite (603)	McMaster.com	91458A34	1	\$12	\$12
Hi Temp Exhaust Paint	McM	7832T1	1	\$5	\$5
Exhaust Heat Shield screws	McM	92855A710	1	\$4	\$4
AC delete brace, Aluminum flat bar	McM	8975K217	1	\$21	\$21
Alternator Stud M10x1.5x1m	McM	99067A251	1	\$11	\$11
Alternator washer M10	McM	91166A280	1	\$4	\$4
AC delete standoffs, M10 nuts	McM	90591A171	1	\$6	\$6
PS hose, 3/8" ID, 5/8" OD	McM	54605K29	10	\$1	\$8
Split loom, nylon (300 degF)					
3/8" ID x 5 ft	McM	2569K21	2	\$2	\$4
1/2" ID x 5 ft	McM	2569K31	2	\$3	\$5
5/8" ID x 5 ft	McM	2569K41	4	\$3	\$13
1-1/4" ID x 5 ft	McM	2569K71	1	\$7	\$7
Cable Ties	McM	70215K54	1	\$8	\$8
Electrical Tape	McM	76455A12	1	\$4	\$4
Hose Clamps	McM	5011T181	1	\$8	\$8
Loctite 242, Blue 10ml	McM	91458A14	1	\$10	\$10
Permatex RTV Gasket Maker	McM	7535A12	1	\$3	\$3
PTFE pipe thread tape	McM	6802K12	1	\$2	\$2
Shaft Collar, for steering shaft clamp	McM	6432K37	1	\$3	\$3
Mach-1 HD PBR Calipers, brackets, pads	StangStore.com		1	\$186	\$186
Caliper to knuckle bolts (M12 x 31)	SHO parts NW		1	\$25	\$25
Rust preventative paint, cleaner, and metal prep	POR-15		1	\$50	\$50
Timing Cover, PP bolts, PS hose	NCturboSHO				\$30
EGR Blockoff plate	diy				\$0
FW resurface	API, local		1	\$40	\$40
Alt Belt (AC delete)	Oreilly's	K60408 (6-rib, 40.8" length)	1	\$18	\$18
Exhaust Manifold studs	Napa ONLINE	HELP #03101, M10x77	2	\$7	\$14
Oil Filter	Napa	NapaGold	1	\$4	\$4
Oil	Advance	Castrol GTX 5w-30	5	\$2	\$10
Half shafts	Advance		2	\$60	\$120
Brake Fluid	Local	ATE Super Blue	2	\$10	\$20
11.6" Rotors	Oreilly's	Wagner, made in USA	2	\$48	\$96
PS high pressure hose	Advance Auto online	Powercraft 71830	1	\$25	\$25
PS return hose	Advance Auto online	Powercraft 91774	1	\$22	\$22
				Total	\$2,593